businesses compared with whites, and whether or not minorities and women who own businesses earn as much income from their businesses as white men, given the individual's qualifications.

CHAPTER 5
THE EFFECTS OF DISCRIMINATION ON HUB FORMATION AND EARNINGS

In this chapter we address the question of whether current discrimination deters minorities

from starting their own businesses and whether minorities and women earn less from their businesses,

once started, than similarly situated white males. In the previous two chapters, we examined the

extent to which businesses owned by minorities and women are underutilized by the State and in the

private sector. Our analysis compared the percent of business revenues received by HUBs to the

percent of businesses with paid employees that are HUBs. In doing so, we ignored two issues. First,

we focused only on the extent to which existing HUBs get business and, thereby, ignored the

possibility that discrimination may deter minorities and women from starting businesses in the first place. This issue is important because, as we discuss in Chapter 7, policymakers may wish to consider efforts to stimulate the formation of HUBs. Second, we did not consider the possibility that HUBs may not do as well as non-HUBs because HUB owners are less qualified than the owners of non-HUB firms. This issue is important because, under *Croson*, the State may not be able to implement race-based remedies if HUB underutilization results only from HUBs having lesser qualifications than non-HUBs. That is true even if the HUBs' poorer qualifications, such as lesser education or experience, result from societal discrimination, such as lack of access to equal education.

This chapter addresses these two issues by asking the following questions:

- Are minorities less likely to start businesses than whites with similar characteristics?

- If we observe lower business formation rates for minorities, how many HUBs would we expect to see in the absence of discrimination?

- Do minorities and women receive lower earnings from the businesses they start than whites males with similar characteristics earn from their businesses?

- Does evidence on minority business formation and earnings provide evidence of discrimination in the Texas marketplace. If so, how has that discrimination affected HUB formation in Texas?

Our analysis relies on 1990 *Census of Population*[143] data for roughly a 5 percent sample of all individuals in the United States. In addition to providing detailed data on wage earners, these data provide a wealth of information on self-employed individuals—those who own and operate sole proprietorships, partnerships and small corporations.[144] The first section presents our comparison of

---

[143] *Census of Population and Housing*, 1990: Public Use Microdata Samples, U.S., All data files, prepared by the Bureau of the Census, Washington: U.S. Bureau of the Census, 1992.

[144] The previous chapter focused on businesses that were sole proprietorships, partnerships or 1120-S Corporations; it excluded businesses that were 1120 Corporations. The chapter focuses on business *owners* who operate sole proprietorships, partnerships or 1120-S Corporations; it also includes individuals who work

business ownership across race groups.[145] This analysis compares Texas results to those for the nation as a whole. The second section discusses our comparison of self-employment earnings across race/ethnic and sex groups for Texas business owners.

I.   Business Formation

The availability figures reported in the previous two chapters represent the percent of firms with paid employees that are HUBs. These figures may be artificially low if discrimination has made minorities and women more reluctant to start businesses or if it has made the businesses they start more likely to fail. In this section, we examine whether more minority firms would have formed in the absence of discrimination and, if so, how many.

We measure the effect of discrimination on the supply of HUBs for three primary minority race groups: African Americans, Hispanics and Asians.[146] We then use the results to estimate what the availability of HUBs would be at the current time if minorities were not affected by discrimination. Since the method for each race group is the same, we will focus here on African Americans to simplify the discussion. Our basic approach involves three key steps. In the first step, we estimate the rate of African-American self-employment using a sample of African Americans. In the second step, we compare this rate to the rate of African-American self-employment that we would expect if African Americans were as likely to become self-employed as "similarly situated"

---

for their own 1120 Corporations.

[145] For reasons we discuss below, we have not examined differences in business formation between men and women.

[146] We have not taken a similar approach for women because the formation of businesses by women over time is linked with their voluntary participation in the work force. Changes in female labor force participation over time make it very difficult to discern the extent to which the underrepresentation of woman-owned businesses is due to discrimination or the changing role of women in the work force.

whites.[147] To determine whether African Americans and whites are similarly situated, we compared their educational levels, marital status, age, certain family and personal status variables (e.g., how many children they have in their household) and measures of their financial assets (e.g., homeownership, their spouse's income and the amount of interest and dividend income reported). We find that African Americans are self-employed at a lower rate than "similarly situated" whites. This finding is statistically significant.

We recognize that some of the disparity in expected African-American self-employment rates may result from factors that we cannot observe in the data, such as detailed education levels, training, and background (family and work) that are conducive to the establishment of businesses. Consequently, on the basis of the first two steps alone, we have not established that the lower rate of African-American self-employment is due to discrimination. In the third step, we ask whether the lower rate of African-American self-employment is associated with other measures of existing discrimination. We compare the discrepancy in the expected rate of African-American self-employment across MSAs with two measures of discrimination: the ratio of private discrimination lawsuits to total lawsuits and the ratio of African-American hourly wages to white hourly wages. We find that metropolitan areas that have a relatively large proportion of private discrimination lawsuits and a relatively low African-American hourly wage tend to have a relatively large underrepresentation of African Americans in self-employment.

A.   Statistical Analysis of Minority vs. White Self-Employment

In this section, we determine whether race has a significant impact on whether an individual operates a business. We use a statistical technique, known as logit analysis, to answer the following question: Are African Americans less likely to be self-employed than similarly situated whites? Logit

---

[147] We restricted our analysis to full-time business owners.

analysis determines the relationship between a categorical variable—*i.e.* one that can be characterized in terms of a yes or no response as opposed to a continuous number—and a set of characteristics that may influence the value of the categorical variable. For example, logit analysis is used by statisticians to determine whether or not an individual participates in the labor force, retires this year, or has a particular disease—these are all variables that can be categorized by a response of yes (*e.g.*, she's in the labor force) or no (*e.g.*, she's not in the labor force).[148] By reviewing the relationship between the set of characteristics and the value of the categorical variable for a large number of observations, logit analysis can summarize the extent to which each characteristic increases or decreases the likelihood that the categorical variable will be a yes or no. In this chapter, we use logit analysis to examine the relationship between whether a person is self-employed or not (yes/no) and a set of socioeconomic characteristics of that person.

In the situation considered in this chapter, logit analysis is used to examine the relationship between whether a person is self-employed (yes/no) and a set of socioeconomic characteristics of that person. Our logit analysis, therefore, required data on individual workers and their demographic characteristics and employment status. From the 1990 *Census of Population*, we selected a sample of labor force participants. We took all records of self-employed individuals in the primary data set (602,056 records), and selected 15 percent of the remaining (non-self-employed) labor force participants (842,671 records).[149] This initial sample contained data on 1,444,727 individuals.

---

[148] Logit analysis is one of several techniques that can be used to examine qualitative outcomes. Generally, the other techniques yield similar results. For a detailed discussion, see G.S. Maddala, *Limited Dependent and Qualitative Variables in Econometrics*, Cambridge University Press, 1983.

[149] We chose this 15 percent at random from the entire set of non-self-employed labor force participants. We used this subset of the data to keep our dataset a more manageable size. The final proportion of self-employed people in our dataset (roughly one-half) is higher than in the United States as a whole, so we use statistical adjustments to prevent this from biasing our estimates.

From this initial sample, we chose only records for full-time (more than 35 hours per week) workers who live in metropolitan statistical areas (MSAs) and who are 18 years of age or older. We also excluded individuals who work in the public sector. After these cuts, we had a sample of 788,356 individuals. For each of these individuals, the Census reports a variety of information including race (white, African American, Hispanic, Asian), whether the individual is self-employed or works for someone else (i.e., a wage worker), and various demographic and economic characteristics. [150]

We estimated the probability of self-employment for each race group *separately* using logit analysis. We assumed that the probability of self-employment depends on demographic characteristics (e.g., male vs. female, married vs. unmarried, age), human capital (e.g., education), the availability of capital that could be used to start a business (e.g., dividend and interest income, spouse's income, home ownership) and other family or personal status variables (e.g., the number of children living at home, personal handicaps). We also considered three major industries: construction, commodity purchasing and services, since the prospects for starting businesses in these industries probably differ.[151] Table 5.1 lists the complete set of variables used in this analysis. These possible determinants of self-employment were chosen because they correspond to factors that other studies have found to be important and because relevant data are available from the Census.[152]

---

[150] Some people, of course, have more than one job and could be both wage workers and self-employed. An individual is classified as self-employed for the purposes of this study if he or she obtains the majority of his or her earnings from self-employment. Individuals who are self-employed as a second job would not be counted among the self-employed for this purpose.

[151] Although we used four major industry groupings in our utilization and availability analyses (discussed in Chapter 3), we have combined Professional Services and Other Services for this analysis because prospects for starting a business in these categories should be sufficiently similar, and data for the individual procurement categories were insufficient to produce reliable results.

[152] See, for example, David S. Evans and Linda S. Leighton, "Some Empirical Aspects of Entrepreneurship," *American Economic Review*, June 1989 and the studies cited therein.

TABLE 5.1

VARIABLES INCLUDED IN THE POTENTIAL AVAILABILITY LOGIT ANALYSIS

Dependent variable: Indicator variable for self-employment.

Basic indicator variables:

> male or female,
> married or not,
> works in construction, purchasing or services,
> owns his or her home with no mortgage remaining,
> has someone age 65 or older in the household,

Variables indicating handicapped persons:

> limited in type or amount of work,
> mobility limitation,
> personal care limitation.

Age group indicator variables:

> under 25, 25-30, 30-35, 35-40, 40-45, 45-50, 50-55, 55-60, over 60

Highest educational attainment indicator variables:

> did not complete high school,
> completed high school, but not college,
> college graduate,
> master's degree,
> professional degree,
> doctoral degree.

Other variables:

UNEARN	Unearned income, such as interest and dividends.
VALUE	Minimum estimate of household property value.*
MORTGAG3	Monthly amount of mortgage payment.
MORTAMT2	Monthly amount of second mortgage payment.
RESDINC	Residual household income after individual's personal income.
HHCHILD	Number of children living in the household.

Note: *The census records property values within ranges, such as $50,000 - $54,999. For each individual, we use the lower limit of the reported range. Therefore, there are no property values higher than $400,000.

Source: Source of all variables is *1990 Census of Population*.

Using these data, we performed a logistic regression—another name for logit analysis—between whether an individual in our sample was self-employed and these possible determinants of self-employment. We performed this regression separately for each race group. Table 5.2 reports the results of these regressions based on the national data. For each regression, we found that all of these possible determinants were highly correlated with whether an individual was self-employed. Consistent with other studies, older, more highly educated individuals, and persons with greater net worth (proxied by their level of interest and dividend income and homeownership) were more likely to be self-employed.

Our analysis of self-employment for whites gave us a formula—based on the estimated logit regression between whether an individual was self-employed and the possible determinants of self-employment—for the probability that an individual with particular characteristics (education, age, wealth, etc.) would be self-employed. We applied this formula to our sample of African-American individuals to calculate the likelihood that they would be self-employed given their particular characteristics. These calculations gave us the rate of African-American self-employment if African Americans were as likely to become self-employed as similarly situated whites (where "similarly situated" is based on having the same education, age, wealth, etc.). We then compared this predicted African-American self-employment rate to the African-American self-employment rate predicted by the logistic regression on African Americans.

When we used the entire set of national data, the African-American self-employment rate predicted by the African-American regression was substantially less than the expected African-American self-employment rate based on similarly situated whites. The African-American regression predicts that African Americans would have a 4.1 percent self-employment rate. Had they been white, our model predicts their self-employment rate at 8.5 percent—more than twice as high. One

TABLE 5.2

RESULTS OF LOGIT REGRESSIONS FOR EACH
RACE GROUP USING NATIONAL DATA

	White	African American	Hispanic	Asian
Intercept	-4.1916	-4.7283	-4.0072	-4.2013
Sex (1=Male)	0.6277*	0.6519*	0.5664*	0.5509*
Spouse (1=Married)	0.1555*	0.1359*	0.1272*	0.3847*
UNEARN†	0.0190*	0.0278*	0.0177*	0.0299*
Construction (1=Works in)	0.7292*	0.7134*	0.3257*	0.0730
Purchasing (1=Works in)	-0.3414*	-0.7095*	-0.6214*	0.0961**
Owns home (1=Yes)	0.1804*	0.2316*	0.3398*	0.2745*
VALUE†	2.961 E-6*	3.443 E-6*	2.547 E-6*	1.416 E-6*
MORTGAG3†	0.000067*	0.000055	0.00035*	0.000228*
MORTAMT2†	0.000183*	0.000215	-0.00005	0.000122
RESDINC†	-8.89 E-7*	-7.3 E-7	-2.58 E-6*	-1.0 E-6
65+ Resident (1=Yes)	0.0533*	0.0107	-0.0448	-0.1085**
Age:				
25-30 (1=Yes)	0.6327*	0.3299*	0.3171*	0.4701*
30-35 (1=Yes)	0.9950*	0.6063*	0.6055*	0.9010*
35-40 (1=Yes)	1.1959*	0.7962*	0.8225*	1.1193*
40-45 (1=Yes)	1.2339*	0.8938*	0.9255*	1.3718*
45-50 (1=Yes)	1.3168*	1.0925*	1.0807*	1.4544*
50-55 (1=Yes)	1.2948*	1.1054*	1.1909*	1.4634*
55-60 (1=Yes)	1.3175*	1.0485*	1.1735*	1.3243*
Over 60 (1=Yes)	1.6090*	1.3939*	1.3219*	1.3400*
Disability/Handicap:				
Work limitation (1=Yes)	0.1338*	0.2270**	0.1023	-0.0987
Mobility limitation (1=Yes)	-0.00956	-0.0147	0.2193	0.2739
Pers. care limitation (1=Yes)	0.0300	0.0185	0.0576	0.1894**
HHCHILD†	0.0226*	0.0155	0.0106	0.000767
Highest education:				
Some college (1=Yes)	0.0418*	0.0139	0.0204	-0.0697
College graduate (1=Yes)	-0.0493*	0.00137	0.0398	-0.2894*
Master's degree (1=Yes)	-0.5983*	-0.4333*	-0.2837	-0.5517*
Professional degree (1=Yes)	1.1816*	1.8236*	1.2507*	0.9078*
Doctoral degree (1=Yes)	-0.4981*	-0.0619	0.0578	-0.9715*
Number of Observations	646,078	54,871	55,922	27,845

Note: *Statistically significant at the 1 percent level or better.
       **Statistically significant at the 5 percent level or better.
       †Variables defined in Table 5.1.

Source: *1990 Census of Population* and NERA calculations using SAS.

possible explanation for this disparity is that discrimination reduces the opportunity for African-American self-employment.

We performed similar comparisons for each of the other race groups. Using Hispanic data, our model predicts that the Hispanic self-employment rate would be 7.5 percent. Had they been white, our model predicts that their self-employment rate would be 9.6 percent. Our model predicts that Asians are slightly more likely to become self-employed than similarly situated whites.

We performed the same type of logit analysis using a dataset made up only of Texas residents. These estimates capture any systematic differences between the Texas rate of business formation and that of the nation as a whole. Table 5.3 reports the regression results for each race group using only Texas data. As a second step, we calculated the estimated disparity in African-American self-employment for each MSA in Texas by the three major industry categories—construction, services and commodity purchasing. We represent the disparity with a ratio of the African-American self-employment rate predicted using data on African Americans divided by the African-American self-employment rate predicted using the model based on whites. Any value of this ratio that is less than 100 percent implies that there is underrepresentation of African Americans in self-employment after controlling for the factors mentioned above. The difference between the ratio and 100 percent describes the size of the disparity.

For example, a ratio of 75 percent implies a 25 percent underrepresentation of African-American self-employment. Table 5.4 reports these ratios (by major industry and race group) for the nation, for Texas and for five selected Texas MSAs. The five areas provide a rough overview of the larger cities in different regions of the state. The figures reported in the table show some major differences in the self-employment rate disparities across the major industries. For construction, we found that the underrepresentation of African-American self-employment was 50.5 percent nationally.

TABLE 5.3

RESULTS OF LOGIT REGRESSIONS FOR EACH
RACE GROUP USING TEXAS DATA

	White	African American	Hispanic	Asian
Intercept	-4.0110	-4.6602	-4.3113	-4.2149
Sex (1=Male)	0.6541*	0.7264*	0.6504*	0.4775**
Spouse (1=Married)	0.1202*	-0.0151	0.1703	0.5303
UNEARN†	0.0131*	0.0466**	0.0323*	0.00691
Construction (1=Works in)	0.5647*	0.5568**	0.5210*	-0.5818
Purchasing (1=Works in)	-0.3159*	-0.7094*	-0.3942*	-0.1775
Owns home (1=Yes)	0.3306*	0.2139	0.2505**	0.1187
VALUE†	4.198 E-6*	4.721 E-6	9.769 E-6*	7.338 E-6*
MORTGAG3†	-0.00005	0.00004	-0.00009	-0.00009
MORTAMT2†	0.000353**	-0.00056	0.000317	0.00102
RESDINC†	2.986 E-7	2.55 E-6	-6.22 E-6*	4.35 E-6
65+ Resident (1=Yes)	0.0902	0.0833	0.00282	-0.2064
Age:				
25-30 (1=Yes)	0.5301*	0.4652	0.4484**	0.7672
30-35 (1=Yes)	0.9471*	0.7195	0.7182*	0.9956
35-40 (1=Yes)	1.1853*	0.8534*	0.8771*	1.4022**
40-45 (1=Yes)	1.2457*	1.0830*	0.9125*	1.2567
45-50 (1=Yes)	1.2887*	1.4098*	1.2492*	1.8591*
50-55 (1=Yes)	1.2986*	1.1933*	1.2784*	1.7897*
55-60 (1=Yes)	1.4465*	1.3416*	1.3361*	1.5094**
Over 60 (1=Yes)	1.6130*	1.7079*	1.6143*	2.4599*
Disability/Handicap:				
Work limitation (1=Yes)	0.2659*	-0.0682	0.1745	-0.5338
Mobility limitation (1=Yes)	0.0518	0.2743	0.7219	1.3022
Pers. care limitation (1=Yes)	0.0439	-0.2391	-0.0276	-0.2641
HHCHILD†	0.0185**	-0.0330	0.00306	0.0400
Highest education:				
Some college (1=Yes)	-0.00951	-0.1158	0.0347	-0.2308
College graduate (1=Yes)	-0.1451*	-0.2463	-0.1896	-0.3810
Master's degree (1=Yes)	-0.5808*	-0.2280	-0.4707	-1.3091*
Professional degree (1=Yes)	1.1172*	2.0361*	1.4334*	0.3553
Doctoral degree (1=Yes)	-0.3837*	0.4300	0.0214	-1.3307**
Number of Observations	42,792	4,198	10,540	1,257

Note: *Statistically significant at the 1 percent level or better.
             **Statistically significant at the 5 percent level or better.
             †Variables defined in Table 5.1.

Source: *1990 Census of Population* and NERA calculations using SAS.

TABLE 5.4

RATIO OF SELF-EMPLOYMENT ABSENT DISCRIMINATION
TO SELF-EMPLOYMENT GIVEN ACTUAL CONDITIONS
BASED ON THE RESULTS FROM THE LOGIT REGRESSIONS
CONTROLLING FOR PERSONAL CHARACTERISTICS

Race/Industry Group	Nationwide	All Texas	Selected Texas MSAs				
			Austin	Dallas	El Paso	Houston	San Antonio
African American							
Construction	50.5	47.9	50.3	47.9	45.9*	47.9	56.5
Commodity Purchasing	33.2	29.7	29.3	29.8	28.9	30.3	30.7
Services	48.9	45.8	42.7	45.5	48.3	46.2	48.9
Hispanic							
Construction	62.5	67.8	62.0	65.0	73.0	64.8	70.0
Commodity Purchasing	68.2	65.4	65.8	62.7	69.5	63.1	68.1
Services	91.1	73.0	72.9	73.8	74.8	71.2	74.4
Asian							
Construction	52.9	42.7	66.2*	56.4	†	41.4	26.3*
Commodity Purchasing	136.2	154.6	128.6	155.0	155.9	154.1	159.9
Services	87.3	126.0	130.8	127.4	133.4	127.1	113.4

Note: *Ratio computed using a sample of five or fewer observations.
†No observations in the sample with which to compute a ratio.
The complete list of variables controlled for in this analysis is presented in Table 5.1.

Source: *1990 Census of Population* and NERA calculations using SAS.

For services, the underrepresentation of African-American self-employment was 48.9 percent nationally. For commodity purchasing, the underrepresentation of African-American self-employment was 33.2 percent nationally. Thus, on a national basis, the largest disparity in self-employment is in commodity purchasing. This result is not surprising since federal, state, and local programs have, since the mid-1970's, helped stimulate the formation of HUBs in construction and, to a lesser extent, services. Federal or state programs for commodity firms tend to be more limited.

The numbers for other race groups show slightly different patterns across industries, suggesting that cultural differences may play a role. The numbers for Texas and its MSAs are similar to the national numbers in each category, but they are generally lower (more disparity) in most categories. The disparities for African Americans in each procurement category are greater for Texas and for most of the MSAs than for the nation as a whole. This result suggests that African Americans may face greater difficulties on average starting businesses in Texas than in the nation overall. The disparity ratios for Hispanics in Texas are up to twenty percent lower (more disparity) than the national numbers in services and are close to the national numbers in commodity purchasing and in construction. The disparity ratio for Asians in construction is about ten percent less in Texas than at the national level, but the disparity ratios in services and commodities are higher in Texas (less disparity) than at the national level, and both are greater than 100 percent.

The calculations we have discussed above have several limitations. First, if there are any personal characteristics associated with the choice of self-employment that we were unable to include, and if whites tend to have relatively more of these characteristics than minorities, then the differences between the estimated minority self-employment rates could be due to these characteristics rather than discrimination. Second, it is impossible to determine whether the underrepresentation of minorities in self-employment is due to contemporary discrimination, the effects of past social discrimination

or cultural differences between groups. In the next section, however, we present evidence that the underrepresentation of minorities in self-employment is correlated with measures of contemporary discrimination. This correlation indicates that the disparities that we have identified may be at least partly the result of current discrimination.

B. Relationship between Disparities and Discrimination

We obtained data on the number of discrimination lawsuits and total lawsuits for each judicial district in the United States. For each district, we calculated the ratio of private discrimination lawsuits to total lawsuits.[153] We then aggregated the NERA data on estimated and actual self-employment up to the level of these districts by combining MSAs in the same judicial district.[154] We then examined the correlation between the ratio of actual self-employment to estimated self-employment in the absence of discrimination (estimated using the predictions for self-employment rates for similarly situated whites) and the ratio of private discrimination lawsuits to all lawsuits across these districts. We found that there was a consistent correlation for all three race groups between the amount of underrepresentation in self-employment and the proportion of judicial lawsuits that involve claims of private discrimination.

We examined one other possible measure of discrimination. We calculated the ratio of the average weekly wage income for unskilled minority workers to the average weekly wage income for unskilled white workers for each state,[155] and examined the correlation between the magnitude of the wage disparity and the magnitude of the underrepresentation in self-employment. Comparing the

---

[153] We limited discrimination lawsuits to private lawsuits since the filing of discrimination lawsuits by public officials is more likely to be affected by political differences across judicial districts.

[154] Metropolitan boundaries sometimes cut across judicial district boundaries. In these cases, we assigned the MSA to the judicial district with the greatest geographic overlap.

[155] We did this analysis at the state level because, after restricting the dataset to unskilled workers, the number of observations at the individual MSA level was insufficient to yield reliablewage ratios.

wages of unskilled workers only controls for the impact of differences in job qualifications on earnings. For Asians and African Americans, we found a positive correlation between wage and self-employment disparities. We did not find a positive correlation using data on Hispanics.

C. Using the Disparities to Calculate Potential Availability

In Chapter 7, we use the results shown in Table 5.4 to compute potential HUB availability. These calculations begin with a measure of actual availability, such as those described in Chapter 3. To convert actual to potential availability, we make two adjustments. First, recall that the actual availability numbers described in this report are for firms with at least one paid employee. Therefore, they exclude self-employed people who have no paid employees. In contrast, the potential availability disparities derived in this chapter are for all self-employed people whether or not they have paid employees. To correctly apply these disparities as adjustments to the actual availability numbers, we revise the actual availability numbers to include all self-employed people using the ratio of all firms to firms with one or more employees for each race group. These ratios were computed using data from the *Census of Minority and Women-Owned Businesses*. Once we have these estimates of total availability, we apply the second adjustment. The inverse of the disparities listed in Table 5.4 describes the estimated amount of self-employment we would expect in the absence of discrimination relative to the amount of self-employment observed under existing conditions. We scale the revised actual availability numbers up according to this ratio to obtain the measure of potential availability appropriate for each race group and industry.

II. Earnings

Next, we looked at whether minority and women entrepreneurs receive lower earnings from the businesses they start as compared to the earnings received from businesses owned by white males with similar characteristics. For this test, we restricted our dataset to full-time, self-employed

individuals only. We used a statistical technique known as linear regression analysis to assess whether self-employed minorities and women earn less than self-employed white men with similar characteristics. We compared individuals with the same level of education, age, marital status, in the same major occupational categories. We also measured the effect of other characteristics including citizenship and certain disabilities. Table 5.5 reports the complete set of variables used in this analysis.

Linear regression analysis is a statistical technique that summarizes the effect of each of a set of *independent* variables on a *dependent* variable. It is the most common technique used when the dependent variable is a continuous variable, like income, rather than a categorical variable, like whether or not the person is self-employed. By reviewing the values of independent variables and the corresponding dependent variable for a large set of observations, linear regression analysis produces an equation that shows the effect on the dependent variable of any change in an independent variable.[156]

We ran separate regressions for each sex group and for each procurement category. We also ran regressions for each procurement category that included both sexes and distinguished between them with an indicator variable. We found that earnings differences were explained by predictable factors. For example, we found that people with higher levels of education earn more than those with less education. Similarly, very young people, who generally have less work experience, earn less than older people. We also found that some disabilities are associated with reduced earnings, and that marriage, at least for men, is associated with higher earnings. After controlling for such factors, minorities and women still had lower earnings. Many of these results were statistically significant.

---

[156] See William H. Greene, *Econometric Analysis*, MacMillan Publishing Company, 1990.

The full regression results are provided in Appendix F. Table 5.6 briefly summarizes the effects of different parameters and their statistical significance.

TABLE 5.5

**VARIABLES INCLUDED IN THE REGRESSION
ANALYSIS OF SELF-EMPLOYMENT EARNINGS**

Dependent variable: Natural logarithm of total personal income.

Basic indicator variables:

> African American, Hispanic, Asian, White or Other
> male or female,
> married or not,
> speaks English well or not,
> U.S. citizen or not.

Variables indicating handicapped persons:

> limited in kind or amount of work,
> mobility limitation,
> personal care limitation.

Age group indicator variables:

> under 25, 25-30, 30-35, 35-40, 40-45, 45-50, 50-55, 55-60, over 60 .

Highest educational attainment indicator variables:

> did not complete high school,
> completed high school, but not college,
> college graduate,
> master's degree,
> professional degree,
> doctoral degree.

Source: *1990 Census of Population.*

We used the regression coefficients to compute disparity statistics in wage earnings by procurement category and by sex. These disparity statistics take the ratio of self-employment earnings of a given minority group relative to the self-employment earnings of the comparative majority group.

TABLE 5.6

STATISTICALLY SIGNIFICANT PARAMETERS AND THE
DIRECTION OF THEIR EFFECT ON SELF-EMPLOYMENT EARNINGS

	Using Data on Men Only			Using Data on Women Only			Using Data for Both Sexes Combined		
	Construction	Purchasing	Services	Construction	Purchasing	Services	Construction	Purchasing	Services
African American (1=Yes)	-	-	-	0	0	-	-	-	-
Hispanic (1=Yes)	-	-	-	0	-	-	-	-	-
Asian (1=Yes)	0	0	-	0	0	0	0	0	0
Other (1=Yes)	-	0	0	0	0	0	-	0	0
Sex (1=Male)	n/a	n/a	n/a	n/a	n/a	n/a	+	+	+
Spouse (1=Married)	+	+	+	0	0	-	+	+	+
English (1=Speaks well)	+	+	+	+	0	+	+	+	+
Work limitation (1=Yes)	-	-	-	0	-	-	-	-	-
Mobility limitation (1=Yes)	0	0	0	0	0	0	0	0	0
Pers care limitation (1=Yes)	0	0	0	0	0	0	0	0	0
U.S. Citizen (1=Yes)	0	0	0	0	0	0	0	0	0
Age†	+	+	+	0	+	+	+	+	+
Education†	+	+	+	0	+	+	+	+	+
R^2	0.14	0.12	0.28	.018	0.05	0.18	0.14	0.15	0.32
# of observations	3,187	6,017	8,497	161	1,831	4,044	3,348	7,848	12,541
F-value	22.6	34.8	140.8	1.5	3.9	37.6	22.6	55.4	250.1
Prob > F	.0001	.0001	.0001	.0690	.0001	.0001	.0001	.0001	.0001

Note: We report plus (+) or minus (-) signs if the coefficient on the explanatory variable is statistically significant at the five percent level or better. A plus sign (+) means that a larger value of the explanatory variable is associated with higher earnings. A minus sign (-) means that a smaller value of the explanatory variable is associated with higher earnings. We report a zero if the coefficient is not statistically significant. A report of zero does not mean that the coefficient has no effect.

†Category variables are listed as statistically significant if most or all are significant at the five percent level or better.

Source: *1990 Census of Population* and NERA calculations using SAS.

Any value of this ratio that is less than 100 percent implies that the minority group is underpaid in self-employment earnings compared to the majority group after controlling for age, experience and the other factors mentioned above. The difference between the ratio and 100 percent describes the size of the disparity.

Table 5.7 reports the results of these computations. We describe two types of disparity statistics in two sets of three columns each. The first three columns compare non-white race groups and white women to white men within each procurement category. These results show that the earnings of white women, African Americans and Hispanics range from 54 to 75 percent of the earnings of their white male counterparts. All of these disparities are statistically significant. The disparities for Asians, while consistently below 100, are substantive only in construction and none are statistically significant. Finally, the disparities for Native American and other race groups in construction and in services are both less than 75 percent and the disparity for construction is statistically significant. The disparity in purchasing is negligible and is not statistically significant.

The second three columns compare non-white women with white women within each procurement category. The disparities for African-American women are substantively significant for all procurement categories, although only the disparity for services is statistically significant. Hispanic women earn less than white women in all three categories, and the disparities in purchasing and services are statistically significant but not substantively significant. The disparities for Asian women are higher in all categories, and only the disparity in construction is less than 100 percent. None of the disparities for Asian women or women of other race groups is statistically significant.

III.   Summary

In this chapter, we have analyzed the effects of discrimination on minority business formation and on the earnings of businesses established by minorities and women. Similar to our statistical

TABLE 5.7

DISPARITY STATISTICS FOR SELF-EMPLOYMENT
EARNINGS BY PROCUREMENT CATEGORY AND SEX GROUP
AFTER CONTROLLING FOR PERSONAL CHARACTERISTICS

Race/Sex Group	Race/Sex Group Compared to White Men			Non-White Women Compared to White Women		
	Construction	Purchasing	Services	Construction	Purchasing	Services
White Women	63.7*	54.1*	53.5*	--	--	--
African American	66.4*	62.2*	70.9*	36.1	75.4	78.1*
Hispanic	69.4*	69.1*	75.3*	61.3	83.1*	83.3*
Asian	68.8	91.7	90.7	90.1	102.8	119.6
Native American & Other	47.4*	99.4	72.7	160.0	106.0	70.4

Note: *Statistically significant at the five percent level or better.
Complete list of variables controlled for in the analysis is shown in Table 5.5.

Source: *1990 Census of Population* and NERA calculations using SAS.

findings of disparity in private sector and State procurement, we found that large disparities exist in business formation and earnings for African Americans and Hispanics in Texas. These disparities in business formation were generally larger than those for the nation as a whole. African Americans fared worse than any other minority subgroup. For African Americans in Texas, the rate of business formation was generally 50 percent or less than that of similarly situated whites. Further, African Americans who had started their own businesses earned statistically and substantively less from their businesses than similarly situated whites. The rate of Hispanic business formation was roughly two-thirds that of similarly situated whites, and they, too, earned statistically and substantively less from their businesses than similarly situated whites.

Our findings for Asians differ from those for African Americans and Hispanics in that Asians in Texas showed no inhibition towards business formation in commodity purchasing or services; in

fact, we found that there was less disparity in the rate of business formation for Asians in these industries in Texas than on the national level. In construction, however, we found that the Asian rate of business formation in Texas was less than half that of similarly situated whites, and this disparity was larger than the disparity on the national level. Asian-owned firms also earned less from their businesses than similarly situated whites regardless of procurement area, but the earnings disparities were only substantively significant in construction. These results are roughly similar to the results of our disparity analysis of State procurement opportunities reported in Chapter 3. In that analysis, we found that, during the pre-program period, Asian and other minorities were substantially underutilized in construction but were overutilized in professional services. During the program period, Asian-owned firms were overutilized in both professional services and commodity purchasing.

We also looked at the relationship between discrimination and these disparities in business formation. In that analysis, we found consistent positive correlations for all three race groups between the underrepresentation in self-employment in a given geographic area and the proportion of judicial lawsuits that involve claims of private discrimination in that geographic area. This correlation supports the hypothesis that the disparities are associated with discrimination. We also found positive correlations for Asians and African Americans between the self-employment disparity and a second measure of discrimination: the ratio of wages for unskilled minority workers compared to those of unskilled white workers. This finding also supports the hypothesis that the disparities are associated with discrimination.

Finally, although we did not examine the rate of business formation for white women compared to white men, we did find that in all procurement categories, white women earn between half and two-thirds as much from their businesses compared to similarly situated white men, and those differences are statistically significant in all cases. Similarly, our analysis of disparity in the

private and public sector shows that white woman-owned firms were substantially underutilized in all procurement categories, except for State TxDOT construction.[157]

The statistical analyses presented in the last three chapters show that HUBs do not fare nearly as well as non-HUBs in either the public or private sector in Texas. HUBs receive a smaller share of public and private-sector procurements than non-HUBs, and HUB owners receive less income from their businesses than non-HUB owners. In the next chapter, we examine whether there is anecdotal evidence of discrimination against HUBs that could account for these disparities.

---

[157] We found no disparities for white woman-owned firms in State construction. On further investigation, we found that the overall State result was driven by the utilization of white woman-owned firms on TxDOT construction contracts. In all other agencies, white woman-owned firms were substantially underutilized.

This chapter addresses the following issues:

- Do the disparities reported in Chapters 3 through 5 result, at least in part, from discrimination in the Texas marketplace?

- What does the case law in Texas show about the scope of discrimination in Texas?

- Do HUB owners believe they have encountered discrimination, and, if so, in what business situations?

- What problems do HUBs face, apart from discrimination, that affect their ability to compete for contracts?

The previous three chapters have evaluated the relative success of HUBs in the public and private sectors in Texas. We found that HUBs generally received less than their expected share of procurement dollars from the State given their availability. That was also true in the private sector in Texas. We determined that minorities and women earned less from their businesses than did white men with similar personal characteristics. Finally, we found that minorities were less likely to operate businesses than white men with similar characteristics.

Do these statistical disparities stem, at least in part, from discrimination, whether intentional or not, by public and private institutions in Texas? To help answer this question, we examined whether and to what extent there is direct evidence of discrimination against HUBs. We analyzed responses to a mail survey from 4,763 HUBs and 804 non-HUBs. We conducted in-depth interviews and obtained signed statements from approximately 300 HUB representatives and 30 non-HUB representatives. We also reviewed the social science and legal literature on discrimination in Texas and reviewed federal and state case law addressing allegations of discrimination. This chapter reports the results of this investigation.

The chapter is organized as follows. Section I discusses the definition of discrimination we used for our investigation and describes the potential sources of discrimination that we have examined. Section II provides an overview of discrimination in Texas based on court decisions, studies and newspaper accounts. Section III reports the results of the HUB and non-HUB mail surveys. Section IV summarizes the statements made by the 330 HUB and non-HUB representatives with whom we spoke. Section V presents our conclusions from this evidence.

I.   Discrimination and Its Sources

To structure our discussion, it is helpful to analyze discrimination by looking at both the type of discrimination and the source of discrimination. In the employment discrimination context, courts